MATERIAL SAFETY DATA SHEET

SECTION CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MDL INFORMATION SYSTEMS, INC.
1281 Murfreesboro Road, Suite 300
Nashville, TN 37217-2423

1-615-366-2000

EMERGENCY TELEPHONE NUMBER
1-800-424-9300 (NORTH AMERICA)
1-703-527-3887 (INTERNATIONAL)

SUBSTANCE: CADMIUM

TRADE NAMES/SYNONYMS:
CADMIUM ELEMENT; CADMIUM BLUE; C.I. 77180; Cd; OHS03720; RTECS EU9800000

CHEMICAL FAMILY: metal

CREATION DATE: Dec 03 1984
REVISION DATE: Jun 17 2002

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: CADMIUM
CAS NUMBER: 7440-43-9
EC NUMBER (EINECS): 231-152-8
PERCENTAGE: 100.0

SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=4 FIRE=3 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: white
PHYSICAL FORM: powder
MAJOR HEALTH HAZARDS: potentially fatal if inhaled, respiratory tract irritation, kidney damage, cancer hazard (in humans)
PHYSICAL HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

POTENTIAL HEALTH EFFECTS:

INHALATION:
SHORT TERM EXPOSURE: potentially fatal if inhaled, irritation, cough, metallic taste, chills, fever, nausea, vomiting, chest pain, difficulty breathing, headache, dizziness, bluish skin color, lung damage, kidney damage, liver damage
LONG TERM EXPOSURE: irritation (possibly severe), weight loss, difficulty breathing, fatigue, mood swings, lung damage, blood disorders, bone disorders, kidney damage, liver damage, nerve damage, cancer
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: same as effects reported in short term exposure
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: same as effects reported in short term exposure
INGESTION:
SHORT TERM EXPOSURE: nausea, vomiting, diarrhea, headache, dizziness, muscle cramps, blurred vision, kidney damage, liver damage, unconsciousness
LONG TERM EXPOSURE: same as effects reported in long term inhalation

CARCINOGEN STATUS:
OSHA: No
NTP: Yes
IARC: Yes

SECTION 4 FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If a large amount is swallowed, get medical attention

ANTIDOTE: calcium disodium edetate/dextrose, intravenous; calcium disodium edetate/procaine, intramuscular.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire and explosion hazard in bulk form. Finely divided material may ignite or explode.

EXTINGUISHING MEDIA: dolomite, dry powder for metal fires, dry sand, graphite, soda ash, sodium chloride

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is

out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products.

SECTION 6 ACCIDENTAL RELEASE MEASURES

WATER RELEASE:
Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

OCCUPATIONAL RELEASE:
Avoid heat, flames, sparks and other sources of ignition. Do not touch spilled material. Small spills: Collect spilled material in appropriate container for disposal. Move containers away from spill to a safe area. Large spills: Wet down area with water. Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Clean up residue with a high-efficiency particulate filter vacuum. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

SECTION 7 HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

HANDLING: Use methods to minimize dust.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
CADMIUM:
CADMIUM (as Cd):
0.005 mg/m3 OSHA TWA
0.0025 mg/m3 OSHA action level
0.2 mg/m3 OSHA TWA (dust)
0.6 mg/m3 OSHA ceiling (dust)
0.1 mg/m3 OSHA TWA (fume)
0.3 mg/m3 OSHA ceiling (fume) (vacated by 58 FR 35338, June 30, 1993)
0.01 mg/m3 ACGIH TWA
0.002 mg/m3 ACGIH TWA (respirable particulate)
0.03 mg/m3 AGS TRK (inhalable dust fraction) (production) (welding fumes)
0.015 mg/m3 AGS TRK (inhalable dust fraction) (others)
0.025 mg/m3 UK MEL TWA

MEASUREMENT METHOD: Particulate filter; Acid; Flame atomic absorption spectrometry; NIOSH IV # 7048

VENTILATION: Ventilation equipment should be explosion-resistant if explosive concentrations of

material are present. Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves. OSHA REGULATED SUBSTANCES: U.S. OSHA 29 CFR 1910.1027.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
0.05 mg/m3
Any air-purifying respirator with a full facepiece and a high-efficiency particulate filter.
0.125 mg/m3
Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter.
Any supplied-air respirator with a full facepiece.
Any supplied-air respirator operated in a continuous-flow mode.
0.25 mg/m3
Any air-purifying respirator with a full facepiece and a high-efficiency particulate filter.
Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter.
Any supplied-air respirator with a full facepiece.
Any supplied-air respirator operated in a continuous-flow mode.
1.25 mg/m3
Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter.
Any supplied-air respirator with a full facepiece.
Any supplied-air respirator operated in a continuous-flow mode.
5 mg/m3
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: solid
APPEARANCE: lustrous
COLOR: white
PHYSICAL FORM: powder
ODOR: Not available
MOLECULAR WEIGHT: 112.41
MOLECULAR FORMULA: Cd
BOILING POINT: 1409 F (765 C)
MELTING POINT: 610 F (321 C)
VAPOR PRESSURE: 1 mmHg @ 394 C

VAPOR DENSITY: Not applicable
SPECIFIC GRAVITY (water=1): 8.642
WATER SOLUBILITY: insoluble
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: acids, ammonium nitrate solutions, hot sulfuric acid, hydrochloric acid

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure

CONDITIONS TO AVOID: Avoid generating dust. Avoid heat, flames, sparks and other sources of ignition.

INCOMPATIBILITIES: oxidizing materials, acids, metals

CADMIUM:
AMMONIUM NITRATE (FUSED): Violent or explosive reaction
HYDRAZOIC ACID: May explode violently.
NITRYL FLUORIDE: Incandescent reaction when heated slightly
OXIDIZERS (STRONG): Fire and explosion hazard.
SELENIUM: Exothermic reaction.
SULFUR: Fire and explosion hazard.
TELLURIUM: Incandescent reaction in hydrogen atmosphere.
ZINC: Intense exothermic reaction.

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: oxides of cadmium

POLYMERIZATION: Will not polymerize

SECTION 11 TOXICOLOGICAL INFORMATION

CADMIUM:
TOXICITY DATA:
88 ug/m3/8.6 year(s) inhalation-man TCLo; 39 mg/m3/20 minute(s) inhalation-human LCLo; 15 mg/kg unreported-man LDLo; 2330 mg/kg oral-rat LD50; 25 mg/m3/30 minute(s) inhalation-rat LC50; 1140 mg/kg unreported-rat LD50; 890 mg/kg oral-mouse LD50; 5700 ug/kg intraperitoneal-mouse LD50; 890 mg/kg unreported-mouse LD50; 70 mg/kg oral-rabbit LDLo; 6 mg/kg subcutaneous-rabbit LDLo; 5 mg/kg intravenous-rabbit LDLo; 2.5 mg/kg intravenous-rabbit LD; 3.5 mg/kg intravenous-rabbit LD; 77.5 mg/kg skin-mouse LDLo; 546 mg/kg/26 week(s) continuous oral-rat TDLo; 1512 mg/kg/48 week (s) continuous oral-rat TDLo; 21880 mg/kg/78 week(s) continuous oral-pig TDLo
CARCINOGEN STATUS: NTP: Known Human Carcinogen; IARC: Human Sufficient Evidence, Animal Sufficient Evidence, Group 1 (Cadmium and cadmium compounds), Animal Limited Evidence (Cadmium metal); ACGIH: A2 -Suspected Human Carcinogen (Cadmium and cadmium compounds);

TRGS 905: K 2
Exposure to cadmium has been associated with an increased risk of lung cancer.
LOCAL EFFECTS:
Irritant: inhalation
ACUTE TOXICITY LEVEL:
Highly Toxic: inhalation
Moderately Toxic: ingestion
TARGET ORGANS: kidneys
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: kidney disorders, respiratory disorders
TUMORIGENIC DATA:
129 ug/m3 inhalation-woman TCLo/20 year(s) continuous; 3372 ug/kg subcutaneous-rat TDLo; 40 mg/kg intramuscular-rat TDLo/4 week(s) intermittent; 1200 mg/kg unreported-rat TDLo; 70 mg/kg intramuscular-rat TD; 63 mg/kg intramuscular-rat TD; 45 mg/kg intramuscular-rat TD/4 week(s) intermittent
MUTAGENIC DATA:
micronucleus test - mouse embryo 6 umol/L; cytogenetic analysis - hamster ovary 1 umol/L
REPRODUCTIVE EFFECTS DATA:
155 mg/kg oral-rat TDLo 13 week(s) male week(s) pre pregnancy/13 week(s) pregnant female/3 week (s) continuous; 220 mg/kg oral-rat TDLo 1-22 day(s) pregnant female continuous; 21500 ug/kg oral-rat TDLo multigenerations; 23 mg/kg oral-rat TDLo 1-22 day(s) pregnant female continuous; 1124 ug/kg intraperitoneal-rat TDLo 1 day(s) male; 250 ug/kg subcutaneous-rat TDLo 19 day(s) pregnant female continuous; 1250 ug/kg intravenous-rat TDLo 14 day(s) pregnant female continuous; 1250 ug/kg intravenous-rat TDLo 9 day(s) pregnant female continuous; 8 mg/kg intravenous-rat TDLo 8-15 day(s) pregnant female continuous; 448 mg/kg oral-mouse TDLo multigenerations; 1700 mg/kg oral-mouse TDLo 8-12 day(s) pregnant female continuous; 1686 ug/kg intraperitoneal-mouse TDLo 7 day(s) pregnant female continuous; 2 mg/kg parenteral-hamster TDLo 8 day(s) pregnant female continuous
ADDITIONAL DATA: Smoking may result in higher blood lead levels.
Deficiencies in iron, calcium, zinc, protein and vitamins C and D may enhance the toxic effects.
Alterations of drug metabolizing activity have been induced in animals.

HEALTH EFFECTS:
INHALATION:
ACUTE EXPOSURE:
CADMIUM: The average concentration of fume responsible for fatalities is 40-50 mg/m3 for 1 hour or 9 mg/m3 for 5 hours. Early symptoms may include mild irritation of the upper respiratory tract, rhinitis, vertigo, a sensation of constriction of the throat, a metallic taste in the mouth and cough. A latent period from 1-10 hours may precede the onset of rapidly progressing dyspnea, cyanosis, substernal or precordial chest pain, and a flu-like syndrome with weakness, malaise, nausea, vomiting, headache, fever, chills, shivering, profuse sweating, and muscular pains in the back and limbs. Cough with foamy or bloody sputum and pulmonary rales mark the onset of acute pulmonary edema which usually develops within 24 hours and reaches a maximum by 3 days. If death from asphyxia does not occur, and exposure was mild, symptoms may resolve within a week. In more severe exposures, all symptoms including proliferative interstitial pneumonitis may persist from 3-10 days. Permanent pulmonary fibrosis and hypertrophy of bronchial vessels may occur. The fatality rate has been estimated to be between 15-20%. Acute renal necrosis and/or liver damage may develop following massive acute exposure. Sequelae from non-fatal exposure may include microcytic, hypochromic anemia, testicular atrophy, cardiovascular effects, emphysema, anemia and osteomalacia.

CHRONIC EXPOSURE:
CADMIUM: Cadmium is highly cumulative. Repeated or prolonged exposure may cause irreversible lung injury of the emphysematous type with cough and shortness of breath, abnormal lung function, airways obstruction and possibly pulmonary fibrosis. Ulceration of the nasal septum and yellow discoloration of the teeth may occur. Cadmium induced kidney damage is irreversible and may progress

after exposure ceases. Proteinuria may be the first sign of damage and may be associated with glucosuria, aminoaciduria, impaired excretion, decreased concentrating capacity, increased excretion of calcium and phosphorus, and increased plasma creatinine. Calciuria may favor the development of kidney stones. Some cases of kidney failure have been reported. Osteomalacia, osteoporosis, and spontaneous fractures may occur and may be manifested as back pain, pain in the extremities, difficulty in walking, and pain on bone pressure. Other symptoms may include damage to the olfactory nerve and anosmia, hemolytic and iron-deficiency anemia, weight loss, and irritability. Some studies suggest a relationship between cadmium levels in air and human cardiovascular disease and hypertension, but causal association has not been proven. Long-term sequelae may include renal tubular necrosis, cardiovascular effects, and liver damage. Occupational exposure to cadmium is implicated in a significant increase in the incidence of prostatic and respiratory cancers. One study also reports a significant increase in renal cancers in those with inferred occupational exposure to cadmium. There is also limited information suggesting that cadmium may interfere with sperm production in humans.

SKIN CONTACT:
ACUTE EXPOSURE:
CADMIUM: Direct contact may result in irritation.

CHRONIC EXPOSURE:
CADMIUM: Repeated or prolonged exposure to irritants may cause dermatitis.

EYE CONTACT:
ACUTE EXPOSURE:
CADMIUM: Direct contact may cause irritation, redness, pain and smarting, but no injury has been reported.

CHRONIC EXPOSURE:
CADMIUM: Repeated or prolonged exposure to irritants may cause conjunctivitis.

INGESTION:
ACUTE EXPOSURE:
CADMIUM: Cadmium is a powerful emetic which induces vomiting so that less is retained and absorbed. If sufficient amounts are absorbed systemic toxicity may occur. Symptoms, which may begin within 1-60 minutes after ingestion, are salivation, choking, severe nausea, persistent vomiting, diarrhea, tenesmus, abdominal pain, blurred vision, dizziness, vertigo, headache, muscular cramps and rarely, convulsions, exhaustion, collapse, shock and unconsciousness. If death occurs, it is usually within 24 hours from shock due to fluid loss, or, it may be delayed 7-14 days and result from acute renal failure or cardiopulmonary depression. If victim survives, delayed liver and/or kidney damage may occur. A dose exceeding 300 mg may be fatal.

CHRONIC EXPOSURE:
CADMIUM: Cadmium is highly cumulative. Prolonged low level exposure may cause irreversible renal tubular dysfunction as described in chronic inhalation. Animal experiments indicate antagonistic activity between cadmium and zinc such that abnormal zinc metabolism was found to contribute significantly to the toxic syndrome following prolonged ingestion of cadmium. Functional changes in the liver, pancreas and adrenal glands which alter glucose metabolism may occur. Although inconclusive, some studies suggest a relationship between prolonged exposure to cadmium and human cardiovascular disease and hypertension. A study which supports this theory was reported where female rats exhibited hypertension after chronically ingesting cadmium through their drinking water. Reproductive effects such as congenital abnormalities, increased mortality, and reduced rates of growth have been found in animals after prolonged ingestion of cadmium.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY DATA:
FISH TOXICITY: 2.95 ug/L 96 hour(s) LC50 (Mortality) Rainbow trout,donaldson trout (Oncorhynchus mykiss)

INVERTEBRATE TOXICITY: 146.7 ug/L 48 hour(s) EC50 (Immobilization) Water flea (Daphnia magna)

ALGAL TOXICITY: 2 ug/L 210-280 hour(s) (Residue) Algae,phytoplankton,algal mat (Algae)

OTHER TOXICITY: 250 ug/L 24 hour(s) LETH (Mortality) Toad (Bufo arenarum)

FATE AND TRANSPORT:
BIOCONCENTRATION: 3500 ug/L 20 hour(s) BCF (Residue) Common bay mussel,blue mussel (Mytilus edulis) 100 ug/L

SECTION 13 DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. Hazardous Waste Number(s): D006. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 1.0 mg/L.

SECTION 14 TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Cadmium compounds
ID NUMBER: UN2570
HAZARD CLASS OR DIVISION: 6.1
PACKING GROUP: I
MARINE POLLUTANT: CADMIUM

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Cadmium compound (CADMIUM)
ID NUMBER: UN2570
CLASSIFICATION: 6.1
PACKING GROUP: I

LAND TRANSPORT ADR/RID:
PROPER SHIPPING NAME: Cadmium compound
UN NUMBER: UN2570
ADR/RID CLASS: 6.1
CLASSIFICATION CODE: T5
PACKING GROUP: I

AIR TRANSPORT IATA/ICAO:
PROPER SHIPPING NAME: Cadmium compound
UN/ID NUMBER: UN2570
IATA/ICAO CLASS: 6.1

PACKING GROUP: I

MARITIME TRANSPORT IMDG:
PROPER SHIPPING NAME: Cadmium compound
UN NUMBER: UN2570
IMDG CLASS: 6.1
PACKING GROUP: I
MARINE POLLUTANT: CADMIUM

SECTION 15 REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
Cadmium: 10 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):
Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40):
Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: Yes
CHRONIC: Yes
FIRE: Yes
REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65):
Cadmium and compounds

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65:
Known to the state of California to cause the following:
Cadmium and compounds
Cancer (Oct 01, 1987)
Developmental toxicity (May 01, 1997)
Male reproductive toxicity (May 01, 1997)

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: Not determined

EUROPEAN REGULATIONS:
EC CLASSIFICATION (CALCULATED):

T+	Very Toxic
T	Toxic
Xi	Irritant

DANGER/HAZARD SYMBOL:

EC RISK AND SAFETY PHRASES:

R 26	Very toxic by inhalation.
R 37	Irritating to respiratory system.
R 49	May cause cancer by inhalation.
S 1	Keep locked-up.
S 2	Keep out of reach of children.
S 4	Keep away from living quarters.
S 13	Keep away from food, drink and animal feedingstuffs.
S 20	When using do not eat or drink.
S 24	Avoid contact with skin.
S 35	This material and its container must be disposed of in a safe way.
S 36	Wear suitable protective clothing.
S 45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 46	If swallowed, seek medical advice immediately and show this container or label.

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

SECTION 16 OTHER INFORMATION

MATERIAL SAFETY DATA SHEET

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MDL INFORMATION SYSTEMS, INC.
1281 Murfreesboro Road, Suite 300
Nashville, TN 37217-2423

1-615-366-2000

EMERGENCY TELEPHONE NUMBER
1-800-424-9300 (NORTH AMERICA)
1-703-527-3887 (INTERNATIONAL)

SUBSTANCE: CHROMIUM

TRADE NAMES/SYNONYMS:
CHROME; CHROMIUM ELEMENT; CHROMIUM METAL; METALLIC CHROMIUM; CHROMIUM POWDER; Cr; OHS05000; RTECS GB4200000

CHEMICAL FAMILY: metal

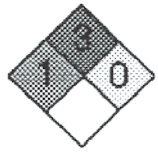
CREATION DATE: Oct 25 1984
REVISION DATE: Sep 16 2002

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: CHROMIUM
CAS NUMBER: 7440-47-3
EC NUMBER (EINECS): 231-157-5
PERCENTAGE: 100

SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0



EMERGENCY OVERVIEW:
COLOR: gray
PHYSICAL FORM: powder
ODOR: odorless
MAJOR HEALTH HAZARDS: No significant target effects reported.
PHYSICAL HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode. Extremely flammable. May ignite spontaneously on exposure to air.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation, skin disorders
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
INGESTION:
SHORT TERM EXPOSURE: vomiting, stomach pain, dizziness
LONG TERM EXPOSURE: no information is available

CARCINOGEN STATUS:
OSHA: No
NTP: No
IARC: No

SECTION 4 FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If a large amount is swallowed, get medical attention.

ANTIDOTE: dimercaprol, intramuscular.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode. Finely divided material may ignite spontaneously. May ignite on exposure to air.

EXTINGUISHING MEDIA: dolomite, dry powder for metal fires, dry sand, graphite, soda ash, sodium chloride

Do not get water directly on material

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Use extinguishing agents appropriate for surrounding fire.

Avoid inhalation of material or combustion by-products.

LOWER FLAMMABLE LIMIT: 0.230 g/L

SECTION 6 ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:
Large spills: Collect spilled material in appropriate container for disposal. Avoid generating dust. Clean up residue with a high-efficiency particulate filter vacuum. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

SECTION 7 HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Store in a tightly closed container. Store in a cool, dry place. Store in a well-ventilated area. Keep separated from incompatible substances.

HANDLING: Use methods to minimize dust.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
CHROMIUM:
1 mg/m3 OSHA TWA
0.5 mg/m3 ACGIH TWA
0.5 mg/m3 NIOSH recommended TWA 10 hour(s)
DFG MAK (skin sensitizer) (dust) (aerosol)
0.5 mg/m3 UK OES TWA

MEASUREMENT METHOD: Particulate filter; Acid; Flame atomic absorption spectrometry; NIOSH IV # 7024

VENTILATION: Provide local exhaust ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
Measurement Element:

Chromium (Cr)
2.5 mg/m3
Any dust and mist respirator.
5 mg/m3
Any dust and mist respirator.
Any supplied-air respirator.
12.5 mg/m3
Any supplied-air respirator.
Any powered, air-purifying respirator with a dust and mist filter.
25 mg/m3
Any air-purifying respirator with a full facepiece and a high-efficiency particulate filter.
Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter.
Any self-contained breathing apparatus with a full facepiece.
Any supplied-air respirator with a full facepiece.
250 mg/m3
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.
Escape -
Any air-purifying respirator with a full facepiece and a high-efficiency particulate filter.
Any appropriate escape-type, self-contained breathing apparatus.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus with a full facepiece.
Under conditions of frequent use or heavy exposure, respiratory protection may be needed.
Respiratory protection is ranked in order from minimum to maximum.
Consider warning properties before use.
Any dust, mist, and fume respirator.
Any air-purifying respirator with a high-efficiency particulate filter.
Any powered, air-purifying respirator with a dust, mist, and fume filter.
Any powered, air-purifying respirator with a high-efficiency particulate filter.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: solid
APPEARANCE: lustrous
COLOR: gray
PHYSICAL FORM: powder
ODOR: odorless
MOLECULAR WEIGHT: 51.996
MOLECULAR FORMULA: Cr
BOILING POINT: 4842 F (2672 C)
MELTING POINT: 3339-3411 F (1837-1877 C)
VAPOR PRESSURE: 1 mmHg @ 1616 C
VAPOR DENSITY: Not applicable
SPECIFIC GRAVITY (water=1): 7.20 @ 28 C
WATER SOLUBILITY: insoluble
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable

COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: dilute sulfuric acid, hydrochloric acid
Insoluble: nitric acid, aqua regia

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid generating dust. Avoid heat, flames, sparks and other sources of ignition.

INCOMPATIBILITIES: bases, oxidizing materials, halogens, peroxides, metals

CHROMIUM:
ALKALI CARBONATES: Attacked.
ALKALIES (CAUSTIC): Attacked.
AMMONIUM NITRATE (FUSED): Violent or explosive reaction.
BROMINE PENTAFLUORIDE: Violent reaction and possible ignition.
HYDROGEN PEROXIDE: Violent decomposition reaction.
LITHIUM (MOLTEN): Vigorous reaction at elevated temperatures.
NITROGEN OXIDE: Incandescent reaction.
OXIDIZERS (STRONG): Fire and explosion hazard.
POTASSIUM CHLORATE (FUSED): Vigorous incandescent reaction.
SULPHUR DIOXIDE: Incandescent reaction.

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: oxides of chromium

POLYMERIZATION: Will not polymerize.

SECTION TOXICOLOGICAL INFORMATION

CHROMIUM:
TOXICITY DATA:
27500 ug/kg unreported-rat LD50
CARCINOGEN STATUS: IARC: Human Inadequate Evidence, Animal Inadequate Evidence, Group 3 (Chromium metal); ACGIH: A4 -Not Classifiable as a Human Carcinogen
ACUTE TOXICITY LEVEL: Insufficient Data.
TUMORIGENIC DATA:
2160 ug/kg intravenous-rat TDLo/6 week(s) intermittent; 1200 ug/kg implant-rat TDLo/6 week(s) intermittent; 75 mg/kg implant-rabbit TDLo
ADDITIONAL DATA: May cross the placenta. May be excreted in breast milk.

HEALTH EFFECTS:
INHALATION:
ACUTE EXPOSURE:
CHROMIUM: High concentrations of dusts or fumes may cause irritation

CHRONIC EXPOSURE:
CHROMIUM: Repeated or prolonged exposure to various chromium compounds has been reported to result in ulceration and perforation of the nasal septum, irritation of the throat and lower respiratory tract, less commonly in gastrointestinal disturbances, blood changes, pulmonary sensitization, pulmonary pneumoconiosis or fibrosis, and rarely liver effects. These effects have not been reported from exposure to the metal per se.

SKIN CONTACT:
ACUTE EXPOSURE:
CHROMIUM: Contact with dusts or powder may cause irritation.

CHRONIC EXPOSURE:
CHROMIUM: Repeated or prolonged exposure to various chromium compounds has been reported to cause various types of dermatitis, including eczema, "chrome holes", sensitization, and, in contact with damaged skin, kidney damage. These effects have not been reported from exposure to the metal per se.

EYE CONTACT:
ACUTE EXPOSURE:
CHROMIUM: Contact with dusts or powders may cause irritation

CHRONIC EXPOSURE:
CHROMIUM: Repeated or prolonged exposure to some chromium compounds may cause conjunctivitis and lacrimation. These effects have not been reported from exposure to the metal per se.

INGESTION:
ACUTE EXPOSURE:
CHROMIUM: Chromium metal is poorly absorbed by the intestinal tract. Absorption of sufficient amounts of some chromium compounds may result in dizziness, intense thirst, abdominal pain, vomiting, shock, oliguria or anuria, and uremia, which may be fatal.

CHRONIC EXPOSURE:
CHROMIUM: No data available.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY DATA:
FISH TOXICITY: 14300 ug/L 96 hour(s) LC50 (Mortality) Common, mirror, colored, carp (Cyprinus carpio)

INVERTEBRATE TOXICITY: 2000 ug/L 0-5 hour(s) LETH (Mortality) Copepod (Tisbe holothuriae)

ALGAL TOXICITY: 3000-5000 ug/L NR hour(s) (Population Growth) Blue-green algae (Synechocystis aquatilis)

PHYTOTOXICITY: 9900 ug/L 32 week(s) EC50 (Biomass) Water-milfoil (Myriophyllum spicatum)

FATE AND TRANSPORT:
BIOCONCENTRATION: 20-40 ug/L NR week(s) BCF (Residue) Common bay mussel,blue mussel (Mytilus edulis) 100 ug/L

SECTION 13 DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Hazardous Waste Number(s): D007. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 5.0 mg/L. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.

SECTION 14 TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Metal powders, flammable, n.o.s. (chromium)
ID NUMBER: UN3089
HAZARD CLASS OR DIVISION: 4.1
PACKING GROUP: II

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Metal powder, flammable, n.o.s. (CHROMIUM)
ID NUMBER: UN3089
CLASSIFICATION: 4.1
PACKING GROUP: II

LAND TRANSPORT ADR/RID:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s. (CHROMIUM)
UN NUMBER: UN3089
ADR/RID CLASS: 4.1
CLASSIFICATION CODE: F3
PACKING GROUP: II

AIR TRANSPORT IATA/ICAO:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s. (CHROMIUM)
UN/ID NUMBER: UN3089
IATA/ICAO CLASS: 4.1
PACKING GROUP: II

MARITIME TRANSPORT IMDG:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s. (CHROMIUM)
UN NUMBER: UN3089
IMDG CLASS: 4.1
PACKING GROUP: II

SECTION 15 REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
CHROMIUM: 5000 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):
Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40):
Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: No
CHRONIC: No
FIRE: Yes
REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65):
CHROMIUM

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated

STATE REGULATIONS:
California Proposition 65: Not regulated.

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: Not determined.

EUROPEAN REGULATIONS:
EC CLASSIFICATION (CALCULATED): Not determined.

EC RISK AND SAFETY PHRASES:
GERMAN REGULATIONS:
WATER HAZARD CLASS (WGK):
STATE OF CLASSIFICATION: VwVwS
CLASSIFICATION UNDER HAZARD TO WATER: 0

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

SECTION 16 OTHER INFORMATION

MSDS SUMMARY OF CHANGES
SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS
SECTION 3 HAZARDS IDENTIFICATION
SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION
SECTION 14 TRANSPORT INFORMATION

MATERIAL SAFETY DATA SHEET

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MDL INFORMATION SYSTEMS, INC.
1281 Murfreesboro Road, Suite 300
Nashville, TN 37217-2423

1-615-366-2000

EMERGENCY TELEPHONE NUMBER
1-800-424-9300 (NORTH AMERICA)
1-703-527-3887 (INTERNATIONAL)

SUBSTANCE: COPPER

TRADE NAMES/SYNONYMS:
C.I. PIGMENT METAL 2; COPPER DUST; COPPER FUME; COPPER-AIRBORNE; COPPER-BRONZE; COPPER-MILLED; COPPER SLAG-AIRBORNE; COPPER SLAG-MILLED; GOLD BRONZE; Cu; OHS05430; RTECS GL5325000

CHEMICAL FAMILY: metal

CREATION DATE: Dec 03 1984
REVISION DATE: Sep 16 2002

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: COPPER
CAS NUMBER: 7440-50-8
EC NUMBER (EINECS): 231-159-6
PERCENTAGE: 100

SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: red
PHYSICAL FORM: crystals, solid
ODOR: odorless
MAJOR HEALTH HAZARDS: respiratory tract irritation, eye irritation
PHYSICAL HAZARDS: Flammable solid. Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation, metal fume fever
LONG TERM EXPOSURE: metallic taste
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
EYE CONTACT:
SHORT TERM EXPOSURE: irritation, blurred vision
LONG TERM EXPOSURE: irritation
INGESTION:
SHORT TERM EXPOSURE: nausea, vomiting, diarrhea, weight loss, headache
LONG TERM EXPOSURE: no information on significant adverse effects

CARCINOGEN STATUS:
OSHA: No
NTP: No
IARC: No

SECTION 4 FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. Give large amounts of water or activated charcoal slurry. When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention.

ANTIDOTE: calcium disodium edetate/dextrose, intravenous; penicillamine, oral

NOTE TO PHYSICIAN: For ingestion, consider gastric lavage. Consider oxygen.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

EXTINGUISHING MEDIA: dolomite, dry powder for metal fires, dry sand, graphite, soda ash, sodium chloride

Do not get water directly on material

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products.

AUTOIGNITION: 1292 F (700 C)

SECTION 6 ACCIDENTAL RELEASE MEASURES

SOIL RELEASE:
Dig holding area such as lagoon, pond or pit for containment. Absorb with sand or other non-combustible material. Cover with plastic sheet or tarp to minimize spreading and protect from contact with water.

WATER RELEASE:
Absorb with activated carbon. Remove trapped material with suction hoses. Collect spilled material using mechanical equipment.

OCCUPATIONAL RELEASE:
Avoid heat, flames, sparks and other sources of ignition. Do not touch spilled material. Small spills: Collect spilled material in appropriate container for disposal. Move containers away from spill to a safe area. Large spills: Wet down area with water. Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Clean up residue with a high-efficiency particulate filter vacuum. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

SECTION 7 HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
COPPER:
COPPER AND COMPOUNDS (as Cu):
0.1 mg/m3 OSHA TWA (fume)
1 mg/m3 OSHA TWA (dust) (mist)
0.2 mg/m3 ACGIH TWA (fume)
1 mg/m3 ACGIH TWA (dust) (mist)
0.1 mg/m3 NIOSH recommended TWA 10 hour(s) (fume)
1 mg/m3 NIOSH recommended TWA 10 hour(s) (dust) (mist)
1 mg/m3 DFG MAK (peak limitation category-II,1, with excursion factor of 2) (inhalable dust fraction)
0.1 mg/m3 DFG MAK (peak limitation category-II,1, with excursion factor of 2) (respirable dust

fraction) (fume)
0.2 mg/m3 UK OES TWA (fume)
1 mg(Cu)/m3 UK OES TWA (metal) (dust) (mist)
2 mg(Cu)/m3 UK OES STEL (metal) (dust) (mist)

MEASUREMENT METHOD: Particulate filter; Acid; Flame atomic absorption spectrometry; NIOSH IV # 7029

VENTILATION: Provide local exhaust ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
Measurement Element:
Copper (Cu)
1 mg/m3
Any dust, mist, and fume respirator.
Any supplied-air respirator.
2.5 mg/m3
Any supplied-air respirator.
Any powered, air-purifying respirator with a dust, mist, and fume filter.
5 mg/m3
Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter.
Any supplied-air respirator with a full facepiece.
Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter.
100 mg/m3
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.
Escape -
Any air-purifying respirator with a full facepiece and a high-efficiency particulate filter.
Any appropriate escape-type, self-contained breathing apparatus.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus with a full facepiece.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: solid
APPEARANCE: lustrous
COLOR: red
PHYSICAL FORM: crystals, solid

ODOR: odorless
MOLECULAR WEIGHT: 63.5
MOLECULAR FORMULA: Cu
BOILING POINT: 4653-4703 F (2567-2595 C)
MELTING POINT: 1981 F (1083 C)
VAPOR PRESSURE: 1 mmHg @ 1628 C
VAPOR DENSITY: Not applicable
SPECIFIC GRAVITY (water=1): 8.92
WATER SOLUBILITY: insoluble
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: nitric acid, hot sulfuric acid, hot hydrogen bromide
Slightly Soluble: hydrochloric acid, ammonium hydroxide

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid generating dust. Avoid heat, flames, sparks and other sources of ignition.

INCOMPATIBILITIES: combustible materials, acids, oxidizing materials, metal salts, bases, halo carbons, halogens, peroxides, reducing agents, metal oxides

COPPER:
ACETYLENE: Forms explosive copper acetylide.
ACETYLENIC COMPOUNDS: Formation of explosive acetylides.
ACIDS: May react.
ALUMINUM + SULFUR: Possible explosion.
AMMONIUM NITRATE: Violent or explosive reaction.
BARIUM BROMATE: Explosive reaction by heat, impact or friction.
BARIUM CHLORATE: Explosive reaction by heat, impact or friction.
BARIUM IODATE: Explosive reaction by heat, impact or friction.
BASES: May react.
1-BROMO-2-PROPYNE: Formation of explosive compound.
CALCIUM BROMATE: Explosive reaction by heat, impact or friction.
CALCIUM CHLORATE: Explosive reaction by heat, impact or friction.
CALCIUM IODATE: Explosive reaction by heat, impact or friction.
CHLORATES: Explosive reaction.
CHLORINE: Ignition reaction.
CHLORINE + OXYGEN DIFLUORIDE: Explosive reaction at -10 C.
CHLORINE TRIFLUORIDE: Intense reaction with possible ignition.
DIMETHYL SULFOXIDE + TRICHLOROACETIC ACID: Possible explosion.
ETHYLENE OXIDE: Possible explosion.
FLUORINE: Ignition reaction.
HYDRAZINIUM NITRATE: Ignition reaction.
HYDRAZOIC ACID: Possible explosion.
HYDROGEN PEROXIDE: Violent decomposition.

HYDROGEN SULFIDE: Intense exothermic reaction with possible ignition
LEAD AZIDE: Forms explosive copper azide.
MAGNESIUM BROMATE: Explosive reaction by heat, impact or friction.
MAGNESIUM CHLORATE: Explosive reaction by heat, impact or friction
MAGNESIUM IODATE: Explosive reaction by heat, impact or friction.
OXIDIZERS: May react.
PHOSPHORUS: Incandescent reaction.
POTASSIUM BROMATE: Explosive reaction by heat, impact or friction.
POTASSIUM CHLORATE: Explosive reaction by heat, impact or friction.
POTASSIUM DIOXIDE: Incandescent reaction.
POTASSIUM IODATE: Explosive reaction by heat, impact or friction.
SODIUM AZIDE: Forms explosive compound.
SODIUM BROMATE: Explosive reaction by heat, impact or friction.
SODIUM CHLORATE: Explosive reaction by heat, impact or friction.
SODIUM IODATE: Explosive reaction by heat, impact or friction.
SODIUM PEROXIDE: Incandescent reaction.
SULFUR + CHLORATES: Spontaneous explosion.
SULFURIC ACID: Intense reaction.
ZINC BROMATE: Explosive reaction by heat, impact or friction.
ZINC CHLORATE: Explosive reaction by heat, impact or friction.
ZINC IODATE: Explosive reaction by heat, impact or friction.

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: miscellaneous decomposition products

POLYMERIZATION: Will not polymerize

SECTION TOXICOLOGICAL INFORMATION

COPPER:
TOXICITY DATA:
120 ug/kg oral-human TDLo; 375 mg/kg subcutaneous-rabbit LDLo; 0.07 mg/kg intraperitoneal-mouse LD50; 3 gm/kg/60 day(s) continuous oral-rabbit TDLo; 75 mg/kg/2 day(s) intermittent intravenous-rabbit TDLo
LOCAL EFFECTS:
Irritant: inhalation, eye
ACUTE TOXICITY LEVEL: Insufficient Data.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: blood system disorders, kidney disorders, liver disorders, respiratory disorders, skin disorders and allergies
TUMORIGENIC DATA:
100 mg/kg intrapleural-rat TDLo; 10.080 mg/kg oral-mouse TDLo/12 week(s) continuous
REPRODUCTIVE EFFECTS DATA:
152 mg/kg oral-rat TDLo 22 week(s) pre pregnancy continuous; 1520 ug/kg oral-rat TDLo 22 week(s) pre pregnancy continuous; 1210 ug/kg oral-rat TDLo 35 week(s) pre pregnancy continuous; 250 ug/kg intrauterine-rat TDLo 1 day(s) pre pregnancy continuous

HEALTH EFFECTS:
INHALATION:
ACUTE EXPOSURE:
COPPER: Powdered dust may cause irritation of the upper respiratory tract and ulceration and perforation of the nasal septum. A feeling of illness similar to the common cold has been reported with

symptoms of chills and stuffiness of the head. Workers exposed to copper dust in concentrations of 0.075 to 0.120 mg/m3 complained of mild nasal discomfort. Exposure to copper fume may cause irritation to the mucous membranes. Freshly formed copper fumes may cause metal fume fever. Symptoms may include a sweet, metallic, or foul taste in the mouth, dry throat, coughing, fever, chills, muscle aches, weakness, lassitude, nausea, rarely vomiting, mild to severe headaches, and sometimes exaggerated mental activity. Workers exposed to concentrations of 1 to 3 mg/m3 experienced an altered taste response but no nausea.

CHRONIC EXPOSURE:
COPPER: Prolonged industrial exposure may cause a green discoloration of the skin, hair and teeth. Welders exposed to copper fume experienced atrophic rhinitis, metallic taste, runny nose, and mucosal irritation of the mouth and eyes. Exposure in animals has caused destruction of red blood cells and lung cell injury. It is inconclusive as to whether prolonged exposure has any affect on the nervous system. A small number of studies suggest an affinity of copper for the sympathetic system, however, there is no proof that chronic poisoning will affect either the central or peripheral nervous system.

SKIN CONTACT:
ACUTE EXPOSURE:
COPPER: May be irritating and cause keratinization. Allergic dermatitis although rare, has been reported. Dermal absorption is negligible through intact skin.

CHRONIC EXPOSURE:
COPPER: Repeated or prolonged contact may cause irritation and discoloration of the skin.

EYE CONTACT:
ACUTE EXPOSURE:
COPPER: The dust may cause irritation with redness and pain, tearing, and blurred vision. Copper particles in the eye may result in a foreign body response with characteristic discoloration of ocular tissue, degeneration and/or detachment of the retina, and atrophy of the globe.

CHRONIC EXPOSURE:
COPPER: Repeated or prolonged exposure to irritants may cause conjunctivitis.

INGESTION:
ACUTE EXPOSURE:
COPPER: May cause headache, weakness, diarrhea, or weight loss. 120 ug/kg ingested by a human caused gastrointestinal disorder with nausea and vomiting.

CHRONIC EXPOSURE:
COPPER: Copper is an essential element and is found in most human diets in minute amounts. Prolonged ingestion through the diet is not known to cause toxic effects except in people with a recessive gene disorder termed Wilson's disease which causes an abnormally high absorption, retention, and storage of copper by the body. This disease may cause a dysfunction of and structural damage to the liver, central nervous system, kidney, bones and eyes. The disease is usually progressive and may be fatal if left untreated. Reproductive effects have been reported in animals.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY DATA:
FISH TOXICITY: 370 ug/L 96 hour(s) LD50 (Mortality) Silverside (Basilichthys australis)

INVERTEBRATE TOXICITY: 31.8 ug/L 48 hour(s) EC50 (Immobilization) Water flea (Daphnia

magna)

ALGAL TOXICITY: 91.8 ug/L 15 hour(s) LC50 (Mortality) Green algae (Scenedesmus dimorphus)

PHYTOTOXICITY: 0.5 ug/L NR year(s) (Cellular) Waterweed (Elodea canadensis)

OTHER TOXICITY: 2.5-15 ug/L NR hour(s) (Population) Aquatic community (Aquatic community)

FATE AND TRANSPORT:
BIOCONCENTRATION: 5830 ug/L 4 hour(s) BCF (Residue) Midge (Chironomus riparius) 87 ug/L

ENVIRONMENTAL SUMMARY: Highly toxic to aquatic life.

SECTION 3 DISPOSAL CONSIDERATIONS

Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. Dispose in accordance with all applicable regulations.

SECTION 14 TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Metal powders, flammable, n.o.s. (copper)
ID NUMBER: UN3089
HAZARD CLASS OR DIVISION: 4.1
PACKING GROUP: II

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Metal powder, flammable, n.o.s. (COPPER)
ID NUMBER: UN3089
CLASSIFICATION: 4.1
PACKING GROUP: II

LAND TRANSPORT ADR/RID:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s. (COPPER)
UN NUMBER: UN3089
ADR/RID CLASS: 4.1
CLASSIFICATION CODE: F3
PACKING GROUP: II

AIR TRANSPORT IATA/ICAO:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s. (COPPER)
UN/ID NUMBER: UN3089
IATA/ICAO CLASS: 4.1
PACKING GROUP: II

MARITIME TRANSPORT IMDG:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s. (COPPER)
UN NUMBER: UN3089
IMDG CLASS: 4.1
PACKING GROUP: II

SECTION 15 REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
COPPER: 5000 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):
Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40):
Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: Yes
CHRONIC: No
FIRE: Yes
REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65):
COPPER AND COMPOUNDS (as Cu)
COPPER

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated

STATE REGULATIONS:
California Proposition 65: Not regulated

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: Not determined.

EUROPEAN REGULATIONS:
EC CLASSIFICATION (CALCULATED):

Xi	Irritant

DANGER/HAZARD SYMBOL:

EC RISK AND SAFETY PHRASES:

R 36	Irritating to eyes.
R 37	Irritating to respiratory system.
S 2	Keep out of reach of children.
S 24	Avoid contact with skin.
S 25	Avoid contact with eyes.
S 26	In case of contact with eyes, rinse immediately with plenty of water and seek medical

	advice.
S 46	If swallowed, seek medical advice immediately and show this container or label.

GERMAN REGULATIONS:
WATER HAZARD CLASS (WGK):
STATE OF CLASSIFICATION: VwVwS
CLASSIFICATION UNDER HAZARD TO WATER: 0

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed

SECTION 16 OTHER INFORMATION

MSDS SUMMARY OF CHANGES
SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION
SECTION 3 HAZARDS IDENTIFICATION
SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION
SECTION 11 TOXICOLOGICAL INFORMATION
SECTION 14 TRANSPORT INFORMATION

MATERIAL SAFETY DATA SHEET

SECTION CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MDL INFORMATION SYSTEMS, INC.
1281 Murfreesboro Road, Suite 300
Nashville, TN 37217-2423

1-615-366-2000

EMERGENCY TELEPHONE NUMBER
1-800-424-9300 (NORTH AMERICA)
1-703-527-3887 (INTERNATIONAL)

SUBSTANCE: LEAD

TRADE NAMES/SYNONYMS:
C.I. PIGMENT METAL 4; C.I. 77575; LEAD FLAKE; LEAD S 2; PLUMBUM; LEAD ELEMENT; LEAD GRANULES; Pb-S 100; ROUGH LEAD BULLION; SSO 1; Pb; OHS12510; RTECS OF7525000

CHEMICAL FAMILY: metal

CREATION DATE: Dec 10 1984
REVISION DATE: Sep 18 2001

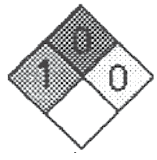
SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: LEAD
CAS NUMBER: 7439-92-1
EC NUMBER (EINECS): 231-100-4
PERCENTAGE: 99.8

OTHER CONTAMINANTS:
BISMUTH, COPPER, ARSENIC, ANTIMONY, TIN, IRON, SILVER, ZINC

SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=0 REACTIVITY=0



EMERGENCY OVERVIEW:
COLOR: white to gray
PHYSICAL FORM: solid
MAJOR HEALTH HAZARDS: nerve damage, kidney damage, birth defects, suspect cancer hazard

(in animals)
PHYSICAL HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation, nausea, vomiting, diarrhea, constipation, stomach pain, chest pain, fatigue, sleep disturbances, emotional disturbances, muscle cramps, visual disturbances, kidney damage, liver damage, paralysis, brain damage, convulsions
LONG TERM EXPOSURE: same as effects reported in short term exposure, changes in blood pressure, loss of appetite, weight loss, headache, disorientation, joint pain, eye damage, hormonal disorders, blood disorders, nerve damage, reproductive effects, birth defects, coma
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation (possibly severe)
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: same as effects reported in short term exposure
INGESTION:
SHORT TERM EXPOSURE: same as effects reported in short term inhalation
LONG TERM EXPOSURE: same as effects reported in long term inhalation

CARCINOGEN STATUS:
OSHA: No
NTP: No
IARC: Yes

SECTION 4 FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If a large amount is swallowed, get medical attention

ANTIDOTE: dextrose/water, intravenous; mannitol solution, intravenous; dimercaprol, intramuscular; calcium disodium edetate/procaine, intramuscular; penicillamine, oral.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

EXTINGUISHING MEDIA: dolomite, dry powder for metal fires, dry sand, graphite, soda ash, sodium chloride

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products.

SECTION 6 ACCIDENTAL RELEASE MEASURES

WATER RELEASE:
Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

OCCUPATIONAL RELEASE:
Collect spilled material in appropriate container for disposal. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

SECTION 7 HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Store in a cool, dry place. Keep separated from incompatible substances.

HANDLING: Use methods to minimize dust.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
LEAD:
If any employee is exposed to lead for more than 8 hours per day, use the following formula for the maximum permissible limit (in ug(Pb/m3): 400 divided by hours worked in the day.

LEAD, INORGANIC FUMES AND DUST (as Pb):
50 ug/m3 OSHA TWA 8 hour(s)
30 ug/m3 OSHA action level 8 hour(s)
0.05 mg/m3 ACGIH TWA
0.100 mg/m3 NIOSH recommended TWA 10 hour(s)
0.1 mg/m3 DFG MAK (peak limitation category-III) (inhalable dust fraction)

MEASUREMENT METHOD: Particulate filter; Nitric acid/Hydrogen peroxide; Atomic absorption spectrometry; NIOSH III # 7082, ALSO # 7105

VENTILATION: Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain

and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves. OSHA REGULATED SUBSTANCES: U.S. OSHA 29 CFR 1910.1025.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
Lead (Pb)
0.5 mg/m3
Any air-purifying respirator with a full facepiece and a high-efficiency particulate filter.
2.5 mg/m3
Any air-purifying respirator with a full facepiece and a high-efficiency particulate filter.
50 mg/m3
Any powered, air-purifying respirator with a high-efficiency particulate filter.
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.
100 mg/m3
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: solid
COLOR: white to gray
ODOR: Not available
MOLECULAR WEIGHT: 207.20
MOLECULAR FORMULA: Pb
BOILING POINT: 3164 F (1740 C)
MELTING POINT: 622 F (328 C)
VAPOR PRESSURE: 1.3 mmHg @ 970 C
VAPOR DENSITY: Not applicable
SPECIFIC GRAVITY (water=1): 11.3
WATER SOLUBILITY: almost insoluble
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: nitric acid, hot concentrated sulfuric acid

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: None reported.

INCOMPATIBILITIES: oxidizing materials, halogens, combustible materials, peroxides, metals, metal carbide, acids

LEAD:
AMMONIUM NITRATE: Violent or explosive reaction.
CHLORINE TRIFLUORIDE: Violent reaction.
DISODIUM ACETYLIDE: Trituration in mortar may be violent and liberate carbon.
HYDROGEN PEROXIDE (52% OR GREATER): Violent decomposition.
HYDROGEN PEROXIDE (60% SOLUTION) + TRIOXANE: Spontaneously detonable.
METALS (ACTIVE): Incompatible.
NITRIC ACID: Lead-containing rubber may ignite.
OXIDIZERS (STRONG): Incompatible.
SODIUM AZIDE: Forms lead azide and copper azide in copper pipe.
SODIUM CARBIDE: Vigorous reaction.
SULFURIC ACID (HOT): Reacts.
ZIRCONIUM-LEAD ALLOYS: Ignition on impact.

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: oxides of lead

POLYMERIZATION: Will not polymerize.

SECTION TOXICOLOGICAL INFORMATION

LEAD:
TOXICITY DATA:
450 mg/kg/6 year(s) oral-woman TDLo; 10 ug/m3 inhalation-human TCLo; 1 gm/kg intraperitoneal-rat LDLo; 160 mg/kg oral-pigeon LDLo; 1050 ug/kg/30 week(s) intermittent oral-rat TDLo; 6879 mg/kg/5 week(s) continuous oral-mouse TDLo; 20 mg/m3/6 hour(s)-30 day(s) intermittent inhalation-guinea pig TCLo; 200 ug/m3/6 hour(s)-26 week(s) intermittent inhalation-guinea pig TCLo
CARCINOGEN STATUS: IARC: Human Inadequate Evidence, Animal Sufficient Evidence, Group 2B (Lead and inorganic lead compounds); ACGIH: A3 -Animal Carcinogen (Lead and inorganic lead compounds)
Renal tumors were produced in animals by lead acetate, subacetate and phosphate given orally, subcutaneously or intraperitoneally. No evaluation could be made of the carcinogenicity of powdered lead.
ACUTE TOXICITY LEVEL: Insufficient Data.
TARGET ORGANS: nervous system, kidneys, teratogen
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: blood system disorders, gastrointestinal disorders, nervous system disorders, respiratory disorders
MUTAGENIC DATA:
cytogenetic analysis - human unreported 50 ug/m3; cytogenetic analysis - rat inhalation 23 ug/m3 16 week(s); cytogenetic analysis - monkey oral 42 mg/kg 30 week(s)
REPRODUCTIVE EFFECTS DATA:
790 mg/kg oral-rat TDLo multigenerations; 1140 mg/kg oral-rat TDLo 14 day(s) pre pregnancy/21 day (s) post pregnancy continuous; 520 mg/kg oral-rat TDLo 7-22 day(s) pregnant female/10 day(s) post pregnancy continuous; 1100 mg/kg oral-rat TDLo 1-22 day(s) pregnant female continuous; 10 mg/m3 inhalation-rat TCLo/24 hour(s) 1-21 day(s) pregnant female continuous; 3 mg/m3 inhalation-rat TCLo/24 hour(s) 1-21 day(s) pregnant female continuous; 1120 mg/kg oral-mouse TDLo

multigenerations; 6300 mg/kg oral-mouse TDLo 1-21 day(s) pregnant female continuous; 300 mg/kg oral-mouse TDLo 1-2 day(s) pregnant female continuous; 4800 mg/kg oral-mouse TDLo 1-16 day(s) pregnant female continuous; 662 mg/kg oral-domestic animal TDLo 1-21 week(s) pregnant female continuous; 814 mg/kg oral-domestic animal TDLo 5 week(s) pre pregnancy/1-21 week(s) pregnant female continuous; 2118 mg/kg oral-mammal TDLo 15 day(s) post pregnancy continuous
ADDITIONAL DATA: May cross the placenta. Smoking may result in higher blood lead levels. May be excreted in breast milk.

HEALTH EFFECTS:
INHALATION:
LEAD: See information on lead compounds and metal fume fever.

ACUTE EXPOSURE:
LEAD COMPOUNDS: Absorption of large amounts of lead may cause a metallic taste, thirst, a burning sensation in the mouth and throat, salivation, abdominal pain with severe colic, vomiting, diarrhea of black or bloody stools, constipation, fatigue, sleep disturbances, dullness, restlessness, irritability, memory loss, loss of concentration, delirium, oliguria often with hematuria and albuminuria, encephalopathy with visual failure, paresthesias, muscle pain and weakness, convulsions, and paralysis. Death may result from cardiorespiratory arrest or shock. Survivors of acute exposure may experience the onset of chronic intoxication. Liver effects may include enlargement and tenderness, and jaundice. The fatal dose of absorbed lead is approximately 0.5 grams. Pathological findings include gastrointestinal inflammation and renal tubular degeneration.

METAL FUME FEVER: Metal fume fever, an influenza-like illness, may occur due to the inhalation of freshly formed metal oxide particles sized below 1.5 microns and usually between 0.02-0.05 microns. Symptoms may be delayed 4-12 hours and begin with a sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms may include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalized feeling of malaise. Fever, chills, muscular pain, mild to severe headache, nausea, occasional vomiting, exaggerated mental activity, profuse sweating, excessive urination, diarrhea and prostration may also occur. Tolerance to fumes develops rapidly, but is quickly lost. All symptoms usually subside within 24-36 hours.

CHRONIC EXPOSURE:
LEAD COMPOUNDS: Prolonged or repeated exposure to low levels of lead may result in an accumulation in body tissues and exert adverse effects on the blood, nervous systems, heart, endocrine and immune systems, kidneys, and reproduction. Early stages of lead poisoning, "plumbism", may be evidenced by anorexia, weight loss, constipation, apathy or irritability, occasional vomiting, fatigue, headache, weakness, metallic taste in the mouth, gingival lead line in persons with poor dental hygiene, and anemia. Loss of recently developed motor skills is generally observed only in children. More advanced stages of poisoning may be characterized by intermittent vomiting, irritability and nervousness, myalgia of the arms, legs, joints and abdomen, paralysis of the extensor muscles of the arms and legs with wrist and/or foot drop. Severe "plumbism" may result in persistent vomiting, ataxia, periods of stupor or lethargy, encephalopathy with visual disturbances which may progress to optic neuritis and atrophy, hypertension, papilledema, cranial nerve paralysis, delirium, convulsions, and coma. Neurologic sequelae may include mental retardation, seizures, cerebral palsy, and dystonia musculorum deformans. Irreversible kidney damage has been associated with industrial exposure. Reproductive effects have been exhibited in both males and females. Paternal effects may include decreased sex drive, impotence, sterility and adverse effects on the sperm which may increase the risk of birth defects. Maternal effects may include miscarriage and stillbirths in exposed women or women whose husbands were exposed, abortion, sterility or decreased fertility, and abnormal menstrual cycles. Lead crosses the placenta and may affect the fetus causing birth defects, mental retardation, behavioral disorders, and death during the first year of childhood. Animal studies indicate that reproductive effects may be additive if both parents are exposed to lead.

METAL FUME FEVER: There is no form of chronic metal fume fever, however, repeated bouts with symptoms as described above are quite common. Resistance to the condition develops after a few days of exposure, but is quickly lost in 1 or 2 days.

SKIN CONTACT:
LEAD: See information on lead compounds.

ACUTE EXPOSURE:
LEAD COMPOUNDS: Contact with lead powders or dust may be irritating.

CHRONIC EXPOSURE:
LEAD COMPOUNDS: Prolonged or repeated exposure to the powder or dust may result in dermatitis.

EYE CONTACT:
LEAD: See information on lead compounds.

ACUTE EXPOSURE:
LEAD COMPOUNDS: Lead dust or powders may be irritating. Metallic lead particles may cause an inflammatory foreign body reaction and injury is generally thought to be mechanical and not toxic.

CHRONIC EXPOSURE:
LEAD COMPOUNDS: Prolonged exposure may cause conjunctivitis.

INGESTION:
LEAD: See information on lead compounds.

ACUTE EXPOSURE:
LEAD COMPOUNDS: Absorption of large amounts of lead from the intestinal tract may cause all the same effects as detailed in acute inhalation. The fatal dose of absorbed lead is approximately 0.5 grams.

CHRONIC EXPOSURE:
LEAD COMPOUNDS: Prolonged or repeated exposure to low levels of lead may result in an accumulation in body tissues and adverse effects on the kidneys, heart and blood and on the nervous, reproductive, endocrine and immune systems as detailed in chronic inhalation.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY DATA:
FISH TOXICITY: 2200 ug/L 96 hour(s) LC50 (Mortality) Smallmouth bass (Micropterus dolomieui)

INVERTEBRATE TOXICITY: 25 ug/L 29-51 hour(s) MATC (Reproduction) Opossum shrimp (Mysidopsis bahia)

ALGAL TOXICITY: 950 ug/L 6 hour(s) EC50 (Chlorophyl) Blue-green algae (Synechocystis aquatilis)

PHYTOTOXICITY: 9-45 ug/L 3-9 hour(s) (Residue) Waterweed (Elodea canadensis)

OTHER TOXICITY: 500-1000 ug/L 44 hour(s) (Mortality) American toad (Bufo americanus)

FATE AND TRANSPORT:
BIOCONCENTRATION: 3670 ug/L 4 hour(s) BCF (Residue) Midge (Chironomus riparius) 728 ug/L

ENVIRONMENTAL SUMMARY: Toxic to aquatic life.

SECTION 13 DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Hazardous Waste Number(s): D008. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 5.0 mg/L.

SECTION 14 TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION: No classification assigned.

CANADIAN TRANSPORTATION OF DANGEROUS GOODS: No classification assigned.

LAND TRANSPORT ADR/RID: No classification assigned.

AIR TRANSPORT IATA/ICAO: No classification assigned.

MARITIME TRANSPORT IMDG: No classification assigned.

SECTION 5 REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
LEAD: 10 LBS RQ (solid metal particles < 100 micrometer diameter (0.004 inches))

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):
Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40):
Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: Yes
CHRONIC: Yes
FIRE: No
REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65):
LEAD
LEAD COMPOUNDS

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated

STATE REGULATIONS:
California Proposition 65:

Known to the state of California to cause the following:
LEAD
Cancer (Oct 01, 1992)
Developmental toxicity (Feb 27, 1987)
Male reproductive toxicity (Feb 27, 1987)
Female reproductive toxicity (Feb 27, 1987)
LEAD COMPOUNDS
Cancer (Oct 01, 1992)
Developmental toxicity (Feb 27, 1987)
Male reproductive toxicity (Feb 27, 1987)
Female reproductive toxicity (Feb 27, 1987)

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: Not determined.

EUROPEAN REGULATIONS:
EC CLASSIFICATION (CALCULATED):

T	Toxic

DANGER/HAZARD SYMBOL:

EC RISK AND SAFETY PHRASES:

R 61	May cause harm to unborn child.
R 64	May cause harm to breastfed babies.
S 2	Keep out of reach of children.
S 24	Avoid contact with skin.
S 46	If swallowed, seek medical advice immediately and show this container or label.

GERMAN REGULATIONS:
WATER HAZARD CLASS (WGK):
STATE OF CLASSIFICATION: VwVwS
CLASSIFICATION UNDER HAZARD TO WATER: 0

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

SECTION 16 OTHER INFORMATION

MATERIAL SAFETY DATA SHEET

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MDL INFORMATION SYSTEMS, INC.
1281 Murfreesboro Road, Suite 300
Nashville, TN 37217-2423

1-615-366-2000

EMERGENCY TELEPHONE NUMBER
1-800-424-9300 (NORTH AMERICA)
1-703-527-3887 (INTERNATIONAL)

SUBSTANCE: MERCURY

TRADE NAMES/SYNONYMS:
COLLOIDAL MERCURY; METALLIC MERCURY; INORGANIC MERCURY; ELEMENTAL MERCURY; QUICKSILVER; HYDRARGYRUM; RCRA U151; UN 2809; Hg; OHS14020; RTECS OV4550000

CHEMICAL FAMILY: metal

CREATION DATE: Jan 31 1985
REVISION DATE: Sep 16 2002

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: MERCURY
CAS NUMBER: 7439-97-6
EC NUMBER (EINECS): 231-106-7
EC INDEX NUMBER: 080-001-00-0
PERCENTAGE: 100.0

SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=0 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: gray
PHYSICAL FORM: liquid
ODOR: odorless
MAJOR HEALTH HAZARDS: allergic reactions

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation, allergic reactions, fever, metal fume fever, nausea, vomiting, diarrhea, chest pain, difficulty breathing, headache, impotence, lung damage, heart damage, kidney damage, brain damage
LONG TERM EXPOSURE: allergic reactions, blue lines on the gums, loosening of the teeth, diarrhea, loss of appetite, weight loss, headache, fatigue, disorientation, difficulty speaking, sleep disturbances, emotional disturbances, hallucinations, tremors, hearing loss, menstrual disorders, impaired fertility, kidney damage, nerve damage, reproductive effects
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation, allergic reactions, skin disorders, nausea, vomiting, diarrhea, effects on the brain
LONG TERM EXPOSURE: same as effects reported in long term inhalation
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: no information on significant adverse effects
INGESTION:
SHORT TERM EXPOSURE: irritation, nausea, vomiting
LONG TERM EXPOSURE: same as effects reported in long term inhalation

CARCINOGEN STATUS:
OSHA: No
NTP: No
IARC: No

SECTION 4 FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

ANTIDOTE: dimercaprol/oil, intramuscular; hemodialysis; penicillamine, oral; chelating agent

NOTE TO PHYSICIAN: For inhalation, consider oxygen. For ingestion, consider gastric lavage. Consider oxygen.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire hazard

EXTINGUISHING MEDIA: regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks.

FLASH POINT: No data available.

SECTION 6 ACCIDENTAL RELEASE MEASURES

WATER RELEASE:
Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

OCCUPATIONAL RELEASE:
Do not touch spilled material. Stop leak if possible without personal risk. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Small dry spills: Move containers away from spill to a safe area. Large spills: Dike for later disposal. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

SECTION 7 HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
MERCURY:
MERCURY, ALL FORMS EXCEPT ALKYL (as Hg):
0.1 mg/m3 OSHA ceiling (vacated by 58 FR 35338, June 30, 1993)
0.05 mg/m3 OSHA TWA (vapor) (skin) (vacated by 58 FR 35338, June 30, 1993)
0.10 mg/m3 ACGIH TWA (aryl) (skin)
0.025 mg/m3 ACGIH TWA (metal and inorganic compounds) (skin)
0.05 mg/m3 NIOSH recommended TWA 10 hour(s) (vapor) (skin)
0.1 mg/m3 NIOSH recommended ceiling (skin)
0.1 mg/m3 DFG MAK (peak limitation category-III) (skin sensitizer) (metal and inorganic compounds)
0.025 mg/m3 UK OES TWA (inorganic divalent compounds)

MEASUREMENT METHOD: Hopcalite; Acid; Atomic absorption spectrometry (cold); NIOSH IV # 6009, Mercury

VENTILATION: Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
0.5 mg/m3
Any chemical cartridge respirator with cartridge(s) providing protection against this substance.
End of service life indicator required (ESLI).
Any supplied-air respirator.
1.25 mg/m3
Any supplied-air respirator operated in a continuous-flow mode.
Any powered, air-purifying respirator with cartridge(s) providing protection against this substance.
End of service life indicator required (ESLI).
2.5 mg/m3
Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against this substance.
End of service life indicator required (ESLI).
Any air-purifying respirator with a full facepiece and a canister providing protection against this substance.
End of service life indicator required (ESLI).
Any supplied-air respirator with a tight-fitting facepiece that is operated in a continuous-flow mode.
Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against this substance.
End of service life indicator required (ESLI).
Any self-contained breathing apparatus with a full facepiece.
Any supplied-air respirator with a full facepiece.
10 mg/m3
Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode.
Escape -
Any air-purifying respirator with a full facepiece and a canister providing protection against this substance.
End of service life indicator required (ESLI).
Any appropriate escape-type, self-contained breathing apparatus.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus with a full facepiece.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: liquid
COLOR: gray
ODOR: odorless
MOLECULAR WEIGHT: 200.59
MOLECULAR FORMULA: Hg
BOILING POINT: 675 F (357 C)
FREEZING POINT: -38 F (-39 C)
VAPOR PRESSURE: 0.002 mmHg @ 25 C

VAPOR DENSITY (air=1): 7.0
SPECIFIC GRAVITY (water=1): 13.5939
WATER SOLUBILITY: insoluble
PH: Not available
VOLATILITY: Not available
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not available
VISCOSITY: 1.55 cP @ 20 C
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: hot sulfuric acid, nitric acid, lipids
Insoluble: alcohol, ether, hydrochloric acid, hydrogen bromide, hydrogen iodide

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Dangerous gases may accumulate in confined spaces. May ignite or explode on contact with combustible materials.

INCOMPATIBILITIES: combustible materials, metals, amines, halogens, oxidizing materials, acids, metal carbide

MERCURY:
ACETYLENE: Formation of explosive compound.
ACETYLINIC COMPOUNDS: Formation of explosive compound.
ALUMINUM: Corrodes.
AMINES: May form explosive compounds.
AMMONIA + MOISTURE: Forms explosive compound.
BORON DIIODPHOSPHIDE: Ignites in contact with mercury vapors.
BROMINE: Violent reaction.
3-BROMOPROPYNE: Explosion hazard.
CALCIUM: Amalgam formation @ 390 C is violent.
CHLORINE: Ignites @ 200-300 C.
CHLORINE DIOXIDE: Explodes.
COPPER (AND ALLOYS): May be attacked.
ETHYLENE OXIDE + TRACES OF ACETYLENE: May form explosive acetylides
LITHIUM: Amalgam formation is violently exothermic and may be explosive.
METHYL AZIDE: Produces shock sensitive mixture.
METHYLSILANE + OXYGEN: Produces shock sensitive mixture.
NITRIC ACID + ALCOHOLS: Forms fulminates capable of detonation.
OXALIC ACID: Forms shock sensitive compound.
OXIDANTS: Violent reaction.
PEROXYFORMIC ACID: Explosive reaction.
POTASSIUM: Amalgam formation is vigorously exothermic and may be explosive.
RUBIDIUM: Violent exothermic reaction.
SILVER PERCHLORATE + 3-HEXYNE: Explodes.
SILVER PERCHLORATE + 2-PENTYNE: Explodes.
SODIUM: Amalgam formation is violently exothermic.
SODIUM CARBIDE: Vigorous reaction.
SULFURIC ACID (HOT): Reacts.
TETRACARBONYLNICKEL + OXYGEN: Produces shock sensitive mixture.

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: mercury, oxides of mercury

POLYMERIZATION: Will not polymerize.

SECTION 11 TOXICOLOGICAL INFORMATION

MERCURY:
TOXICITY DATA:
254 mg/kg subcutaneous-man TDLo; 43 mg/kg oral-man TDLo; 44300 ug/m3/8 hour(s) inhalation-man TCLo; 150 ug/m3/46 day(s) inhalation-woman TCLo; 129 mg/kg/5 hour(s) continuous skin-man TDLo; 714 ul/kg subcutaneous-man TDLo; 571 ul/kg intravenous-man TDLo; 86 ul/kg multiple-man TDLo; 29 mg/m3/30 hour(s) inhalation-rabbit LCLo; 4 mg/m3/2 hour(s)-11 day(s) intermittent inhalation-rat TCLo; 1 mg/m3/24 hour(s)-5 week(s) continuous inhalation-rat TCLo; 8 ug/m3/6.5 hour(s)-41 week(s) intermittent inhalation-rat TCLo; 17 mg/m3/2 hour(s)-30 day(s) continuous inhalation-rat TCLo
CARCINOGEN STATUS: IARC: Human Inadequate Evidence, Animal Inadequate Evidence, Group 3; ACGIH: A4 -Not Classifiable as a Human Carcinogen
LOCAL EFFECTS:
Irritant: inhalation
ACUTE TOXICITY LEVEL: Insufficient Data.
TARGET ORGANS: immune system (sensitizer), nervous system, kidneys
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: kidney disorders, nervous system disorders, respiratory disorders
TUMORIGENIC DATA:
400 mg/kg intraperitoneal-rat TDLo/14 day(s) intermittent
MUTAGENIC DATA:
cytogenetic analysis - man unreported 150 ug/m3
REPRODUCTIVE EFFECTS DATA:
890 ng/m3 inhalation-rat TCLo/24 hour(s) 16 week(s) male; 7440 ng/m3 inhalation-rat TCLo/24 hour(s) 16 week(s) male; 1 mg/m3 inhalation-rat TCLo/24 hour(s) 1-20 day(s) pregnant female continuous; 300 ug/m3 inhalation-rat TCLo/4 hour(s) 7-21 day(s) pregnant female continuous; 146 ug/m3 inhalation-mouse TCLo/2 hour(s) 9 week(s) male

HEALTH EFFECTS:
INHALATION:
ACUTE EXPOSURE:
MERCURY: Inhalation of high levels of mercury vapor may cause almost immediate dyspnea, cough, fever, nausea, vomiting, diarrhea, headache, stomatitis, salivation, gingivitis, a metallic taste, and cardiac abnormalities. Respiratory irritation may occur with chest pain and tightness. Symptoms may resolve or may progress to necrotizing bronchiolitis, pneumonitis, pulmonary edema, pneumothorax, interstitial fibrosis, and death. Acidosis and renal damage may also occur. Allergic reactions that may occur in previously exposed persons include dermatitis, encephalitis, and death. Loss of libido and impotence have been reported in men acutely exposed to metallic mercury vapor. Metal fume fever, an influenza-like illness, may occur due to the inhalation of freshly formed metal oxide particles sized below 1.5 microns and usually between 0.02-0.05 microns. Symptoms may be delayed 4-12 hours and begin with a sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms may include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalized feeling of malaise. Fever, chills, muscular pain, mild to severe headache, nausea, occasional vomiting, exaggerated mental activity, profuse sweating, excessive urination, diarrhea and prostration may also occur. Tolerance to fumes develops rapidly, but is quickly

lost. All symptoms usually subside within 24-36 hours.

CHRONIC EXPOSURE:
MERCURY: Inhalation of mercury vapor over a long period may cause mercurialism, which is characterized by fine tremors and erethism. Tremors may affect the hands first, but may also become evident in the face, arms, and legs. Erethism may be manifested by abnormal shyness, blushing, self-consciousness, depression or despondency, resentment of criticism, irritability or excitability, headache, fatigue, and insomnia. In severe cases, hallucinations, loss of memory, and mental deterioration may occur. Concentrations as low as 0.03 mg/m3 have induced psychiatric symptoms in humans. Renal involvement may be indicated by proteinuria, albuminuria, enzymuria, and anuria. Other effects may include salivation, gingivitis, stomatitis, loosening of the teeth, blue lines on the gums, diarrhea, weight loss, anorexia, speech and sensory disorders, unsteady gait, chronic pneumonitis and mild anemia. Repeated exposure to mercury and its compounds may result in sensitization. Women occupationally exposed have reported menstrual disturbances, reduced ovulation and an increased risk of spontaneous abortion. Intrauterine exposure may result in tremors and involuntary movements in the infants. Mercury is excreted in breast milk. Reproductive effects have been reported in animals.

SKIN CONTACT:
ACUTE EXPOSURE:
MERCURY: Direct contact with liquid may cause irritation and redness. Small amounts of mercury may be absorbed through intact skin. Allergic reactions that may occur in previously exposed persons include dermatitis, encephalitis, and death. Subcutaneous introduction, from handling broken thermometers, may result in local inflammation, granulomatous skin reactions, and slight signs of mercury poisoning including digestive disorders, metallic taste in the mouth, and neuropsychic disorders.

CHRONIC EXPOSURE:
MERCURY: Prolonged or repeated exposure may result in dermal sensitization and systemic effects as detailed in chronic inhalation exposure.

EYE CONTACT:
ACUTE EXPOSURE:
MERCURY: Direct contact with liquid may cause irritation and redness. Animal studies indicate diffusion and absorption of mercury into the tissues of the eye may occur. No clinical signs of conjunctivitis or inflammation occurred.

CHRONIC EXPOSURE:
MERCURY: Mercury exposure from inhalation, ingestion, or skin contact may be indicated by mercurialentis, discoloration of the crystalline lens, on slit lamp examination of the eye.

INGESTION:
ACUTE EXPOSURE:
MERCURY: May cause burning of the mouth and throat, thirst, nausea and vomiting. Metallic mercury is not usually absorbed sufficiently from the gastrointestinal tract to induce an acute toxic response. Rarely, a large single dose may result in signs and symptoms of chronic inhalation if sufficient amounts of mercury are retained in the body.

CHRONIC EXPOSURE:
MERCURY: Repeated ingestion of small amounts of mercury may result in the absorption of sufficient amounts to produce toxic effects as detailed in chronic inhalation exposure.

SECTION 2 ECOLOGICAL INFORMATION

ECOTOXICITY DATA:
FISH TOXICITY: 180 ug/L 96 hour(s) LC50 (Mortality) Common, mirror, colored, carp (Cyprinus carpio)

INVERTEBRATE TOXICITY: 158 ug/L 96 hour(s) LC50 (Mortality) Calanoid copepod (Eurytemora affinis)

PHYTOTOXICITY: 1200 ug/L 32 week(s) EC50 (Growth) Water-milfoil (Myriophyllum spicatum)

FATE AND TRANSPORT:
BIOCONCENTRATION: 2500-4300 ug/L 30 day(s) BCF (Residue) Mosquitofish (Gambusia affinis) 1 ug/L

SECTION 13 DISPOSAL CONSIDERATIONS

Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U151. Hazardous Waste Number(s): D009. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 0.2 mg/L. Dispose in accordance with all applicable regulations.

SECTION 14 TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Mercury
ID NUMBER: UN2809
HAZARD CLASS OR DIVISION: 8
PACKING GROUP: III

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Mercury
ID NUMBER: UN2809
CLASSIFICATION: 8
PACKING GROUP: III

LAND TRANSPORT ADR/RID:
PROPER SHIPPING NAME: Mercury
UN NUMBER: UN2809
ADR/RID CLASS: 8
CLASSIFICATION CODE: C9
PACKING GROUP: III

AIR TRANSPORT IATA/ICAO:
PROPER SHIPPING NAME: Mercury
UN/ID NUMBER: UN2809
IATA/ICAO CLASS: 8
PACKING GROUP: I/III

MARITIME TRANSPORT IMDG:
PROPER SHIPPING NAME: Mercury
UN NUMBER: UN2809

IMDG CLASS: 8
PACKING GROUP: III

SECTION 15 REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
MERCURY: 1 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):
Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40):
Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: Yes
CHRONIC: Yes
FIRE: No
REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65):
Mercury and mercury compounds

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated

STATE REGULATIONS:
California Proposition 65:
Known to the state of California to cause the following:
Mercury and mercury compounds
Developmental toxicity (Jul 01, 1990)

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: Not determined.

EUROPEAN REGULATIONS:
EC CLASSIFICATION (ASSIGNED):

T	Toxic
N	Dangerous for the Environment

EC Classification may be inconsistent with independently-researched data.

DANGER/HAZARD SYMBOL:

EC RISK AND SAFETY PHRASES:

R 23	Toxic by inhalation.
R 33	Danger of cumulative effects.

R 50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S 1/2	Keep locked-up and out of reach of children.
S 7	Keep container tightly closed.
S 45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 60	This material and/or its container must be disposed of as hazardous waste.
S 61	Avoid release to the environment. Refer to special instructions/Safety data sheets.

GERMAN REGULATIONS:
WATER HAZARD CLASS (WGK):
STATE OF CLASSIFICATION: VwVwS
CLASSIFICATION UNDER HAZARD TO WATER: 3

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed

SECTION 16 OTHER INFORMATION

MSDS SUMMARY OF CHANGES
SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION
SECTION 14 TRANSPORT INFORMATION